BEFORE

THE PUBLIC SERVICE COMMISSION OF

SOUTH CAROLINA

DOCKET NO. 2019-182-E - ORDER NO. 2021-569

AUGUST 19, 2021

IN RE:	South Carolina Energy Freedom Act (H.3659) Proceeding Initiated Pursuant to S.C. Code Ann. Section 58-40-20(C): Generic Docket to (1) Investigate and Determine the Costs and Benefits of the Current Net Energy Metering Program and (2) Establish a Methodology for Calculating the Value of the Energy Produced by Customer-Generators (See Docket No. 2020-229-E)	ORDER DETERMINING THE COSTS AND BENEFITS OF NET ENERGY METERING PROGRAMS AND THE VALUE OF CUSTOMER GENERATION

I. INTRODUCTION

Continuing the Commission's implementation of the South Carolina Energy Freedom Act ("Act 62") (enacted by General Assembly in H.3659 (2019)), this Order adopts a new analytical framework to evaluate customer-generator programs, including the existing net energy metering ("NEM") program and future Act 62 solar choice metering programs. The purpose of this generic docket is to "investigate and determine the costs and benefits of the current net energy metering program" and to "establish a methodology for calculating the value of the energy produced by customer-generators." S.C. Code Ann. § 58-40-20(C).

The Commission intends the analytical framework to be flexible, evolving over time to adjust to circumstances, innovation, and technological advances. Under Act 62, the Commission is required to evaluate the costs and benefits of the existing NEM program using an enumerated list of factors. S.C. Code Ann. § 58-40-20(F)(2). Specifically, the

Energy Systems was represented by R. Taylor Speer, Esquire. ORS was represented by Jeffrey M. Nelson, Esquire, and Jenny R. Pittman, Esquire.

In this Order, DESC, DEC and DEP, Justice Center, Nucor Steel, Vote Solar, NCSEA, SEIA, CCL, SACE, Upstate Forever, and ORS are collectively referred to as the "Parties" or sometimes individually as a "Party."

DESC presented the direct and responsive testimony of Mark C. Furtick, direct testimony of Scott Robinson, and direct and responsive testimony of Margot Everett. DEC and DEP presented the direct testimony of George V. Brown and Leigh C. Ford and the direct and rebuttal testimony of Julius A. Wright, Ph.D., Bradley Harris, and Lon Huber. Vote Solar, CCL, SACE, Upstate Forever, SEIA, and NCSEA presented the direct and rebuttal testimony of R. Thomas Beach. SEIA and NCSEA presented the direct and rebuttal testimony of Justin R. Barnes. CCL, SACE, Upstate Forever, and Vote Solar presented the direct testimony of Frank L. Hefner, Ph.D. Vote Solar presented the direct and responsive testimony of Odette Mucha. Alder Energy Systems presented the direct and rebuttal testimony of Donald R. Zimmerman. ORS presented the direct testimony of Robert A. Lawyer, John C. Ruoff, Ph.D., and Brian K. Horii. The Justice Center and Nucor Steel did not present witnesses at the hearing.

IV. FINDINGS OF FACT

Based on the testimony and exhibits received into evidence at the hearing and the entire record of the proceedings, the Commission hereby makes the following findings of fact:

Analytical Framework for Evaluating Customer-Generator Programs Aggregate Marginal Benefits and Costs

1. The requirement of Act 62 to examine long-run benefits and costs of customer-generators in the aggregate to the utility's transmission, distribution, and generation components makes it appropriate to consider a range of values over the expected life of the typical customer-generator system within the analytical framework for analyzing the current NEM program.

2. Marginal costs are the change in the costs of providing electrical service due to a change in demand, which are typically thought of as changes to variable costs. The Act 62 requirement to look at "long-run" marginal costs means that the Commission should consider not just changes in variable costs, but also changes in "fixed" factors such as generation, transmission, and distribution assets because in the long-run these costs are also affected by customer-generator production.

3. By their nature, long-run projections have uncertainty and reflect the risk of over- or underestimating a particular value over a long horizon for which there is currently imperfect information. Considering a range of methodologically sound future estimates of long-run benefits and costs allows the Commission to utilize its discretion to give appropriate weight to this range of outcomes in its ultimate determination under the analytical framework.

4. The record supports a finding of twenty-year expected useful life for solar photovoltaic ("PV") systems. Solar PV may remain productive beyond that time, though total production will decline due to panel degradation.

5. All self-generation that is consumed by a customer-generator within the

billing period is, from the system perspective, equivalent to energy efficiency or demand-side management measures as a decrement to system load.

Cost of Service Analysis

6. The cost of service analysis required by Act 62 can provide evidence of the existence or extent of cross-subsidization between customer-generators and non-customer-generators in the same class within the snapshot of a single test year, but it is not wholly conclusive. The cost of service analyses will be helpful in fine-tuning solar choice metering rates and design in future proceedings but will not itself be determinative.

7. Performing the Act 62 cost of service analysis requires consideration of a hypothetical circumstance, in which customer-generators within a class are separated out as a separate class for analytical purposes. This cost of service analysis aids the Commission in determining: (1) the cost to serve those customer-generators and (2) the relative rate of return received by the electrical utility in providing service to that theoretical class of customers.

8. Act 62 does not require the Commission to create a separate class of service for customer-generators and there is no reason to do so at this time.

9. Performing both embedded and marginal cost of service studies gives the Commission additional information to consider the impact of customer-generators on both historic and future utility costs.

10. Evaluating the theoretical customer-generator classes under the cost of service analytical factor requires load data, or a method consistent with an electrical utility's current load research, on a statistically significant sample of customer-generators. Where this is not currently possible, it is reasonable to estimate the hourly usage profile of

V. REVIEW OF EVIDENCE AND EVIDENTIARY CONCLUSIONS

A. Aggregate Impact of Customer-Generators on Long-Run Marginal Costs

EVIDENCE AND CONCLUSIONS SUPPORTING FINDINGS OF FACT NOS. 1 THROUGH 5

Summary of the Evidence

The evidence in support of these findings of fact are found in the testimony and exhibits in this Docket and the entire record in this proceeding.

Witness Beach, the joint witness of NCSEA, SEIA, Vote Solar, CCL, and SACE ("Joint Witness Beach"), testified that the challenge with determining the aggregate impact of customer-generators on the electrical utility's long-run marginal costs of generation, distribution, and transmission is "calculating long-run marginal costs for certain DER values over the full life of DER resources." (Tr. p. 290.15, lines 6-9) Witness Beach stated that the expected life of solar PV is typically between 25 to 30 years and that such time frame is appropriate for determining long-run values. (Tr. p. 290.21, lines 1-3) Witness Beach testified that typically solar panels do come with a manufacturer's warranty covering the useful life of the solar panels. (Tr. p. 316, line 3 – Tr. p. 317, line 12) Witness Beach's rebuttal asserted that DESC Witness Everett's direct testimony did not analyze the costs and benefits of distributed solar resources over the full economic life of those systems. (Tr. p. 294.5, lines 14-17)

DESC Witness Robinson testified that his analysis of payback period of the current NEM program assumed a "financial life of 20 years, with 0.5% annual degradation." (Tr. p. 93.7, lines 18-20) DESC Witness Furtick noted during cross examination that he performed sensitivity analyses for up to 30 years. (Tr. p.112, lines 6-9) NCSEA and SEIA

Witness Barnes gave a range of expected useful life for solar PV of between 20 to 30 years. (Tr. p. 327.35, lines 1-4)

Witness Beach stated that there are "longstanding and well-accepted" approaches to calculating long-run marginal costs within specific cost categories. (Tr. 290.22, lines 1-5). Specifically, Witness Beach asserted that many utilities use the National Economic Research Associates regression method to determine their long-run marginal disruption capacity costs. (Tr. p. 290.22, lines 2-5) Witness Beach described and applied techniques to calculate long-run avoided capacity costs for generation (Tr. p. 294.09, line 8 – 294.10, line 16), avoided transmission and distribution (Tr. p. 294.12, line 2 – Tr. p. 294.15, line 2), and fuel hedge (Tr. p. 294.15, line 4 – Tr. p. 294.17, line 11), and estimated a value for each of those categories. (Tr. p.294.18)

DEC/DEP Witness Harris testified that it is appropriate to view the long-run marginal costs of customer-generation differently based on whether the generation is consumed behind the meter or is "excess energy" exported to the grid. (Tr. p. 353.13, line 23 – Tr. p. 353.14, line 6) For behind the meter consumption, Witness Harris testified that the impact is the same as if the customer had "reduced their consumption through an energy efficiency or demand-side management program" and should be evaluated in a similar manner. *Id.* For excess energy, Witness Harris stated that it should be evaluated in the same fashion as the Companies' avoided costs, as most recently approved in Docket Nos.2019-185-E and 2019-186-E. *Id.*

ORS Witness Horii defined marginal costs as the "change in the costs of providing electrical service due to a small change in demand." (Tr. p. 576.9, lines 1 – 2) Witness Horii noted that marginal costs are different than average costs, which reflect the costs of

the output of all plants. (Tr. p. 576.9, lines 4 – 5) Witness Horii suggested that the modifier "long-run" before marginal costs in statute "indicates that marginal cost should not just reflect changes in variable costs, but also consider changes in 'fixed' factors such as generation, transmission, and distribution assets." (Tr. p. 576.9, lines 14 – 16)

Commission Conclusions

Act 62 establishes a new set of mandatory analytical tools to evaluate customer-generator programs which adds to and modifies existing methodology. With Order No. 2015-194, the Commission approved a stipulated methodology for determining the value of DERs—or more precisely, the value of solar PV—and the record shows that the categories used to calculate these values remain largely accepted. This methodology has been used to establish the wholesale value of all generation from customer-generators in order to calculate the DER NEM Incentive, a cost recovery mechanism approved by Order No. 2015-194 as part of the compromise and settlement adopting the Act 236 full retail (one-to-one) NEM rate.

Accordingly, it is appropriate to continue use of the valuation categories approved in Order No. 2015-194, with some modifications in this Order to calculation methodologies and new standards to populate particular value categories. Any category or method that the Commission does not address or modify in this Order remains unchanged.

The first major task the legislature put before the Commission was to expand the view of the existing DER valuation method to incorporate long-term costs and benefits from DERs. The Commission is required to consider "the aggregate impact of customer-generators on the electrical utility's long-run marginal cost of generation, distribution, and transmission…." S.C. Code Ann. § 58-40-20(D)(1). There is no real controversy among

parties over the definition of marginal costs as incremental changes in variable costs due to a small change in demand. The Act 62 analytical framework for valuation of customer-generation requires that the Commission takes an appropriate long-run view of the benefits and costs of these customer-generators to an electrical utility's grid. Over the long-run, even costs the Commission has traditionally considered as "fixed" (*e.g.*, generation, distribution, andtransmission) become – in a sense - variable.

As it concerns the length of time over which the analytical framework will view these costs and benefits, the Commission is mindful of the tensions identified by parties that the more distant in time the benefit or cost, the more uncertain the estimate. The Commission is persuaded, however, that it is appropriate to consider the cost-effectiveness of the asset at question as we would any other asset of the electrical utility; that is over the expected useful life of the asset. The Commission is mindful of the uncertainty embedded in future projections and will give appropriate weight based on the reliability and credibility of evidence putting forward future projects on the relevant analytical factors.

The record in this proceeding has revealed that a twenty-year useful life for solar PV is appropriate. Evidence in the record reveals that it is standard for analyses of solar PV to consider 20-year and 30-year useful lives. The Commission finds it is reasonable to adopt the conservative of these approaches and to utilize a 20-year expected useful or financial life for solar PV.

Additionally, as several witnesses observed, it is standard practice for the Commission to consider the cost-effectiveness of demand-side management and energy efficiency investments over the useful lives of those assets or programs. The Commission agrees with witnesses Beach and Harris that solar energy that is consumed by a customer

over the course of a billing period to offset purchases from the utility looks like a reduction/decrement to load akin to energy efficiency, when viewed at a system perspective. Given that the analytical task at hand is to consider the cost-effectiveness of customer-generator programs over the expected useful life of the systems, the Commission adopts a 20-year horizon for considering these valuation categories and notes the distinction between customer-generator electricity that offsets retail kWh purchases from the electrical utility and those excess deliveries to the grid—as determined at the end of the billing period—which are treated as wholesale sales and compensated according to PURPA.

There is a difference between using this method to make a cost-effectiveness determination of a retail program, such as NEM, and the establishment of a wholesale rate under PURPA. The Commission acknowledges that PURPA grants states substantial discretion in determining the method of calculating avoided costs, but that we are constrained by federal statute and regulation in how we determine such a wholesale rate. By contrast, in evaluating state jurisdictional retail customer programs, the Commission has wide discretion to adopt a framework that reflects the requirements of Act 62 and captures the range of values that customer-generators may create.

In adopting a 20-year horizon for the analytical framework for valuing DER, the Commission notes that other elements of the framework take a more short-term look and offer information that is currently outside of the Order No. 2015-194 categories. For example, S.C. Code Ann. Section 58-40-20 (D)(2) consideration of the "cost of service implications" of customer-generators is a novel analysis in South Carolina that will take a look at customer-generators on utility revenues and costs within a single test-year. The

Commission views these approaches as complimentary tools that provide very different information and have different applications in the exercise of Commission authority over successor solar choice metering tariffs.

B. Cost of Service Implications of Customer-Generators

(1) Uses and limits of cost of service analysis of customer-generators

EVIDENCE AND CONCLUSIONS SUPPORTING FINDINGS OF FACT NOS. 6 THROUGH 8

Summary of the Evidence

The evidence in support of these findings of fact are found in the testimony and exhibits in this Docket and the entire record in this proceeding.

NCSEA and SEIA Witness Barnes testified that the usefulness of a cost of service study ("COSS") is relative to the overall analytical framework being used. Witness Barnes stated that a typical distributed generation ("DG") valuation method will take a long-run view of marginal benefits and costs, whereas a COSS represents a "snapshot in time of DG customer responsibility and payment for embedded costs." (Tr. p. 327.12, lines 8 – 12) While a COSS provides useful information, Barnes suggested that it does not capture what is in the interests of ratepayers in the long term. As he explained, the scope of a COSS is narrower than the scope of a typical long-run DER evaluation because the "cost of service study focuses only on the past and only on costs reflected in the utility system." (Tr. p. 327.12, lines 13 – 18) A consequence of this short-term look, Barnes suggested, is that a COSS tends to treat "some costs (*e.g.*, distribution investments) as fixed even though DG can contribute to longer-term avoidance of these types of costs." (Tr. p. 327.12, line 21 – Tr. p. 327.13, line 3)

state's economy that do exist but are difficult to quantify given the existing record. Going forward the Commission adopts witness Dr. Wright's analysis of direct and indirect beneficial economic impacts for future NEM proceedings.

EVIDENCE AND CONCLUSIONS SUPPORTING FINDING OF FACT NO. 27

Summary of the Evidence

The evidence in support of this finding of fact are found in the testimony and exhibits in this Docket and the entire record in this proceeding.

DESC Witness Everett testified that the methodology employed by DESC to conduct a cost-benefit analysis is based on the "California Standard Practice Manual Economic Analysis of Demand-Side Programs and Projects," which is widely used to evaluate customer programs. (Tr. p. 125.21, lines 9-14). According to Witness Everett, DESC used four of the standard tests from the manual, specifically, the "Total Resource Cost Test;" "Program Administrator Cost Test;" "Participant Cost Test;" and "Ratepayer Impact Measure Test." (Tr. p. 125.23, line 4 (Table 4)). Witness Everett explains that these tests are appropriate to evaluate NEM programs because, "The tests outlined in the Standard Practice Manual are widely used in evaluation of other customer programs such as Energy Efficiency and Demand Response, which have similar characteristics to NEM programs, particularly since customers install behind the meter technologies to reduce their energy bills." (Tr. p. 125.23, lines 9-12)

Witness Beach illustrates the different approaches that each cost-benefit test incorporates, including the incorporation of different attributes of demand-side benefit and cost. (Tr. p. 290.17, line 5 (Table 1)). Witness Beach advocates for the Commission to give priority to the Utility Cost Test over the Ratepayer Impact Measure test by explaining the

differences and why, in his opinion, one test should be used instead of the other. (Tr. pp. 290.17 – 290.20)

Commission Conclusions

The Commission concludes that the disagreement as to which cost-benefit tests or methods should be used in this proceeding illustrates the importance of receiving all relevant information into evidence of record, then using the Commission's judgment and discretion to properly assign weight to the evidence presented. Consistent with the desire to fully receive relevant information, the Commission finds that all the cost-benefit tests presented in this case illustrate different, relevant perspectives and information. Therefore, in this and future proceedings, the use of a variety of relevant cost-benefit tests may be considered and appropriately weighed by the Commission in its discretion.

VI. ORDERING PARAGRAPHS

1. The Commission requires that utilities begin to incorporate the analytical needs of Act 62 in designing load research studies ordinarily used to inform cost of service studies and to initiate a load research study that includes a statistically significant sample of customer-generators.

2. The Commission requires that in proceedings in which cost of service implications are raised regarding NEM customers, both embedded and marginal costs must be fully evaluated, including long-term cost implications, with the NEM customers being considered – for these analytical purposes only – as a separate rate class.

3. The Commission declines, at this time, to delineate NEM customer-generators into a separate rate class.

4. In this and future proceedings, for the purposes of cost-benefit analysis and

avoided capacity calculation for DER, solar PV shall be considered with a 20-year lifespan.

5. In this and future proceedings, behind-the-meter generation used by customer-generators shall be treated as energy efficiency or demand-side management resources.

6. In this and future proceedings, NEM customer-generators that are net exporters of power during an hour should be recorded as having zero, not negative, energy consumption during that time.

7. In this and future proceedings, the use of cost of service allocators previously approved by the Commission in the most recent rate case are acceptable. Cost of service allocators differing from those previously approved by the Commission may be used with substantial justification.

8. With regard to the value of distributed energy generation under Act 62methodology approved in Commission Order No. 2015-194, the value stack shall be retained with the following modifications:

A. That the stack shall reflect a 20-year expected useful life of solar PV generation assets.

B. That avoided line losses be calculated on a marginal basis considering daylight hours only.

C. That utility integration costs (which are determined in the avoided costs proceeding) should only be applied to exported power because behind the meter consumption is to be viewed the same as energy efficiency and that integrated costs for customer-sited DER should focus more on distribution system related impacts. Electrical utilities shall track